

January 15, 2003

Mr. Jeffrey L. Kaden
Indiana University - South Bend
1700 Mishawaka Avenue
South Bend, Indiana 46634

Dear Mr. Jeffrey L. Kaden,

Re: Exempt Construction and Operation Status,
141-7233-00158

The application from Indiana University - South Bend received on November 19, 1996, has been reviewed. Based on the data submitted and the provisions in 326 IAC 2-1.1-3, it has been determined that the following listed equipment, located at 1700 Mishawaka Avenue, South Bend, Indiana, is classified as exempt from air pollution permit requirements:

Purdue Technology Building:

- a) two (2) natural gas fired boilers, installed in 1952, each rated at 1.2 million British thermal units per hour, both exhausting at one (1) stack; and
- b) four (4) natural gas fired space heaters, three (3) rated at 0.75 million British thermal units per hour and one (1) rated at 0.075 million British thermal units per hour.

Schurz Library:

- a) one (1) natural gas fired boiler, installed in 1988, rated at 2.4 million British thermal units per hour, exhausting at one (1) stack;
- b) one (1) natural gas fired boiler, installed in 1988, rated at 0.9 million British thermal units per hour; and
- c) one (1) natural gas fired boiler, installed in 1988, rated at 0.25 million British thermal units per hour.

Northside Hall:

- a) two (2) natural gas fired boilers, installed in 1962, each rated at 10.0 million British thermal units per hour, each exhausting at one (1) stack;
- b) one (1) natural gas fired boiler, installed in 1962, rated at 8.33 million British thermal units per hour, exhausting at one (1) stack; and
- c) one (1) natural gas fired dye pot, rated at 0.10 million British thermal units per hour.

Greenlawn Hall:

- a) one (1) natural gas fired boiler, installed in 1947, rated at 4.08 million British thermal units per hour, exhausting at one (1) stack.

Riverside Hall:

- a) one (1) natural gas fired furnace, installed in 1970, rated at 0.625 million British thermal units per hour, exhausting at one (1) stack.

University Center:

- a) two (2) natural gas fired boilers, installed in 1963, each rated at 6.982 million British thermal units per hour, exhausting at one (1) stack;
- b) two (2) natural gas fired hot water heaters, each rated at 0.197 million British thermal units per hour; and
- c) one (1) diesel fired emergency generator, rated at 0.1 million British thermal units per hour.

Indiana University - South Bend
South Bend, Indiana
Permit Reviewer: Linda Quigley/EVP

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Fine Arts Building:

- a) one (1) natural gas fired boiler, installed in 1935, rated at 0.125 million British thermal units per hour, exhausting at one (1) stack;
- b) one (1) natural gas fired hot water heater, rated at 0.06 million British thermal units per hour; and
- c) two (2) natural gas fired roof-top units, rated at 0.50 and 0.30 million British thermal units per hour.

The following conditions shall be applicable:

- (1) Pursuant to the requirements of 326 IAC 2-6 the following shall apply:

- (a) The Permittee shall submit an emission statement certified pursuant to the requirements of 326 IAC 2-6. This statement must be received in accordance with the compliance schedule specified in 326 IAC 2-6-3 and must comply with the minimum requirements specified in 326 IAC 2-6-4. The submittal should cover the period defined in 326 IAC 2-6-2(8). The statement must be submitted to:

Indiana Department of Environmental Management
Technical Support and Modeling Section, Office of Air Quality
100 North Senate Avenue, P.O. Box 6015
Indianapolis, Indiana 46206-6015

The submittal by the Permittee does require the certification by the "authorized individual" as defined by 326 IAC 2-1.1-1(1).

- (b) The emission statement required by this permit shall be considered timely if the date postmarked on the envelope or certified mail receipt, or affixed by the shipper on the private shipping receipt, is on or before the date it is due. If the document is submitted by any other means, it shall be considered timely if received by IDEM, OAQ on or before the date it is due.

- (2) Pursuant to 326 IAC 5-1-2 (Opacity Limitations) except as provided in 326 IAC 5-1-3 (Temporary Alternative Opacity Limitations), opacity shall meet the following:

- (a) Opacity shall not exceed an average of thirty percent (30%) in any one (1) six (6) minute averaging period as determined in 326 IAC 5-1-4.
- (b) Opacity shall not exceed sixty percent (60%) for more than a cumulative total of 15 minutes (60 readings) in a 6-hour period as measured according to 40 CFR 60, Appendix A, Method 9 or fifteen (15) one (1) minute nonoverlapping integrated averages for a continuous opacity monitor in a six (6) hour period.

- (3) Pursuant to 326 IAC 6-2-3 (Particulate emission limitations for sources of indirect heating), the particulate emissions from each of the following boilers, two (2) 1.2 million Btu per hour boilers, installed in 1952, located in the Purdue Technology Building, two (2) 10.0 million Btu per hour boilers and one (1) 8.33 million Btu per hour boiler, each installed in 1962, located in Northside Hall, one (1) 4.08 million Btu per hour boiler, installed in 1947, located in Greenlawn Hall, two (2) 6.982 million Btu per hour boilers, each installed in 1963, located in University Center, and the one (1) 0.125 million Btu per hour boiler, installed in 1935, located in the Fine Arts Building shall be limited to 0.32 lb/MMBtu heat input based on the following equation:

$$Pt = \frac{C \times a \times h}{76.5 \times Q^{0.75} \times N^{0.25}}$$

Each boiler was constructed prior to June 8, 1972, therefore, pursuant to 326 IAC 6-2-3(b) the values of Q, N and h shall include the parameters for all facilities in operation on June 8, 1972.

- (4) Pursuant to 326 IAC 6-2-4 (Particulate Emissions Limitations for Sources of Indirect Heating) particulate emissions from each of the following boilers, 2.4 million Btu per hour natural gas fired boiler, 0.9 million Btu per hour natural gas fired boiler and the 0.25 million Btu per hour natural gas fired boiler, each installed in 1988 and located in the Schurz Library, shall be limited to 0.39 lb/MMBtu heat input based on the following equation:

$$Pt = \frac{1.09}{Q^{0.26}}$$

This exemption is the first air approval issued to this source.

An application or notification shall be submitted in accordance with 326 IAC 2 to the Office of Air Quality (OAQ) if the source proposes to construct new emission units, modify existing emission units, or otherwise modify the source.

Sincerely,

Original signed by Paul Dubenetzky

Paul Dubenetzky, Chief
Permits Branch
Office of Air Quality

LQ/EVP

cc: File - St. Joseph County
St. Joseph County Health Department
Air Compliance - Rick Reynolds
Northern Regional Office
Permit Tracking
Air Programs Section- Michelle Boner

**Indiana Department of Environmental Management
Office of Air Quality
and St. Joseph County Health Department**

Technical Support Document (TSD) for an Exemption

Source Background and Description

Source Name: Indiana University - South Bend
Source Location: 1700 Mishawaka Avenue, South Bend, Indiana 46634
County: St. Joseph
SIC Code: 8221
Exemption No.: 141-7233-00158
Permit Reviewer: Linda Quigley/EVP

The Office of Air Quality (OAQ) has reviewed an application from Indiana University - South Bend relating to the operation of a university.

Permitted Emission Units and Pollution Control Equipment

The source consists of the following permitted emission units and pollution control devices:

Purdue Technology Building:

- a) two (2) natural gas fired boilers, installed in 1952, each rated at 1.2 million British thermal units per hour, both exhausting at one (1) stack; and
- b) four (4) natural gas fired space heaters, three (3) rated at 0.75 million British thermal units per hour and one (1) rated at 0.075 million British thermal units per hour.

Schurz Library:

- a) one (1) natural gas fired boiler, installed in 1988, rated at 2.4 million British thermal units per hour, exhausting at one (1) stack;
- b) one (1) natural gas fired boiler, installed in 1988, rated at 0.9 million British thermal units per hour; and
- c) one (1) natural gas fired boiler, installed in 1988, rated at 0.25 million British thermal units per hour.

Northside Hall:

- a) two (2) natural gas fired boilers, installed in 1962, each rated at 10.0 million British thermal units per hour, each exhausting at one (1) stack;
- b) one (1) natural gas fired boiler, installed in 1962, rated at 8.33 million British thermal units per hour, exhausting at one (1) stack; and
- c) one (1) natural gas fired dye pot, rated at 0.10 million British thermal units per hour.

Greenlawn Hall:

- a) one (1) natural gas fired boiler, installed in 1947, rated at 4.08 million British thermal units per hour, exhausting at one (1) stack.

Riverside Hall:

- a) one (1) natural gas fired furnace, installed in 1970, rated at 0.625 million British thermal units per hour, exhausting at one (1) stack.

University Center:

- a) two (2) natural gas fired boilers, installed in 1963, each rated at 6.982 million British thermal units per hour, exhausting at one (1) stack;
- b) two (2) natural gas fired hot water heaters, each rated at 0.197 million British thermal units per hour; and
- c) one (1) diesel fired emergency generator, rated at 0.1 million British thermal units per hour.

Fine Arts Building:

- a) one (1) natural gas fired boiler, installed in 1935, rated at 0.125 million British thermal units per hour, exhausting at one (1) stack;
- b) one (1) natural gas fired hot water heater, rated at 0.06 million British thermal units per hour; and
- c) two (2) natural gas fired roof-top units, rated at 0.50 and 0.30 million British thermal units per hour.

Unpermitted Emission Units and Pollution Control Equipment

There are no unpermitted facilities operating at this source during this review process.

Existing Approvals

There are no existing approvals for this source.

Enforcement Issue

The emission units listed in the Permitted Emission Units and Pollution Control Equipment section (above) were constructed and operated prior to receiving the appropriate approval from IDEM, OAQ, however, no enforcement actions are pending because the emission units are exempt from the requirement to have a permit pursuant to 326 IAC 2-1.1-3(e)(4).

Stack Summary

Stack ID	Operation	Height (feet)	Diameter (feet)	Flow Rate (acfm)	Temperature (°F)
Purdue Tech Building	Boiler	26	2.0	unknown	unknown
Schurz Hall	Boiler	89.3	2.0	unknown	unknown
Northside Hall	Boiler	20	2.0	unknown	unknown
Greenlawn Hall	Boiler	17.25	2.17	unknown	unknown
University Center	Boiler	23.1	2.67 x 4.0	unknown	unknown

Recommendation

The staff recommends to the Commissioner that the operation be approved. This recommendation is based on the following facts and conditions:

Unless otherwise stated, information used in this review was derived from the application and additional information submitted by the applicant.

An application for the purposes of this review was received on November 19, 1996, with additional information received on January 30, 1997, and October 12, 2001.

Emission Calculations

See Appendix A of this document for detailed emissions calculations, pages 1 through 6.

Potential To Emit of Source Before Controls

Pursuant to 326 IAC 2-1.1-1(16), Potential to Emit is defined as “the maximum capacity of a stationary source or emissions unit to emit any air pollutant under its physical and operational design. Any physical or operational limitation on the capacity of a source to emit an air pollutant, including air pollution control equipment and restrictions on hours of operation or type or amount of material combusted, stored, or processed shall be treated as part of its design if the limitation is enforceable by the U. S. EPA, the department, or the appropriate local air pollution control agency.”

Pollutant	Potential To Emit (tons/year)
PM	0.86
PM-10	2.28
SO ₂	0.51
VOC	1.80
CO	21.87
NO _x	30.29

The potential to emit (as defined in 326 IAC 2-7-1(29)) of NO_x is less than 100 tons per year but greater than 25 tons per year. Therefore, the source can be subject to the provisions of 326 IAC 2-6.1. However, the boilers at this source are exempted from permitting rules for the following reason:

This source consists only of educational and teaching activities. Pursuant to 326 IAC 2-1.1-3(e)(4), “educational and teaching activities” means activities conducted at public and nonpublic schools and post-secondary educational institutions for educational, vocational, agricultural, occupational, employment, or technical training purposes provided the activities do not include the production of an intermediate or final product for sale or exchange for commercial profit or distribution. Support activities necessary to the educational and teaching activities are considered to be part of the educational and teaching activities. Support activities do not include the provision of power to the educational and teaching activities from emission units that provide power to multiple projects or from emission units that would otherwise require permitting, such as boilers that provide power to a source or solid waste disposal units, such as incinerators.

The boilers located at this source are considered support activities because the boilers are used for heating purposes only and do not provide power to multiple projects or to emission units that would otherwise require permitting. Therefore, pursuant to 326 IAC 2-1.1-3(e)(4) this source will be issued an exemption.

County Attainment Status

The source is located in St. Joseph County.

Pollutant	Status
PM-10	attainment
SO ₂	attainment
NO ₂	attainment
Ozone	maintenance
CO	attainment
Lead	attainment

- (a) Volatile organic compounds (VOC) are precursors for the formation of ozone. Therefore, VOC emissions are considered when evaluating the rule applicability relating to the ozone standards. St. Joseph County has been designated as attainment or unclassifiable for ozone. Therefore, VOC emissions were reviewed pursuant to the requirements for Prevention of Significant Deterioration (PSD), 326 IAC 2-2 and 40 CFR 52.21.
- (b) St. Joseph County has been classified as attainment or unclassifiable for all other criteria pollutants. Therefore, these emissions were reviewed pursuant to the requirements for Prevention of Significant Deterioration (PSD), 326 IAC 2-2 and 40 CFR 52.21.

Source Status

New Source PSD, Part 70 or FESOP Definition (emissions after controls, based on 8,760 hours of operation per year at rated capacity and/ or as otherwise limited):

Pollutant	Emissions (ton/yr)
PM	0.86
PM10	2.28
SO ₂	0.51
VOC	1.80
CO	21.87
NO _x	30.29

- (a) This new source is **not** a major stationary source because no attainment regulated pollutant is emitted at a rate of 250 tons per year or more, and it is not in one of the 28 listed source categories.
- (b) These emissions were based on information supplied by the source.

Part 70 Permit Determination

326 IAC 2-7 (Part 70 Permit Program)

This existing source is still not subject to the Part 70 Permit requirements because the potential to emit (PTE) of:

- (a) each criteria pollutant is less than 100 tons per year,
- (b) a single hazardous air pollutant (HAP) is less than 10 tons per year, and
- (c) any combination of HAPs is less than 25 tons/year.

This status is based upon information provided in the permit application submitted by the source.

Federal Rule Applicability

- (a) The boilers at this source are not subject to the requirements of the New Source Performance Standard, 326 IAC 12, (40 CFR Part 60.40c, Subpart Dc), because each facility was constructed prior to June 9, 1989.
- (b) There are no National Emission Standards for Hazardous Air Pollutants (NESHAPs)(326 IAC 14 and 40 CFR Part 63) applicable to this source.

State Rule Applicability - Entire Source

326 IAC 2-4.1-1 (New Source Toxics Control)

Pursuant to 326 IAC 2-4.1-1 (New Source Toxics Control), any new process or production unit, which in and of itself emits or has the PTE 10 tons per year of any HAP or 25 tons per year of the combination of HAPs, and is constructed or reconstructed after July 27, 1997, must be controlled using technologies consistent with Maximum Achievable Control Technology (MACT). No facilities with an uncontrolled PTE of 10 tons per year of any single HAP and 25 tons per year of the combination of HAPs have been constructed or reconstructed since July 27, 1997. Therefore, the requirements of 326 IAC 2-4.1-1 (New Source Toxics Control) do not apply to this source.

326 IAC 2-6 (Emission Reporting)

This source is subject to 326 IAC 2-6 (Emission Reporting), because it has the potential to emit greater than ten (10) tons per year of NO_x. Pursuant to this rule, the owner/operator of the source must annually submit an emission statement for the source. The annual statement must be received by April 15 of each year and contain the minimum requirement as specified in 326 IAC 2-6-4. The submittal should cover the period defined in 326 IAC 2-6-2(8)(Emission Statement Operating Year).

326 IAC 5-1 (Opacity Limitations)

Pursuant to 326 IAC 5-1-2 (Opacity Limitations), except as provided in 326 IAC 5-1-3 (Temporary Alternative Opacity Limitations), opacity shall meet the following, unless otherwise stated in this permit:

- (a) Opacity shall not exceed an average of thirty percent (30%) any one (1) six (6) minute averaging period as determined in 326 IAC 5-1-4.
- (b) Opacity shall not exceed sixty percent (60%) for more than a cumulative total of fifteen (15) minutes (sixty (60) readings) as measured according to 40 CFR 60, Appendix A, Method 9 or fifteen (15) one (1) minute nonoverlapping integrated averages for a continuous opacity monitor) in a six (6) hour period.

State Rule Applicability - Individual Facilities

326 IAC 6-1-2 (Non-attainment Area Particulate Limitations)

This source is located in a county listed in 326 IAC 6-1-7, but is not specifically listed in 326 IAC 6-1-15. The potential to emit PM is less than one hundred (100) tons per year and the actual PM emissions are less than ten (10) tons per year, from the total of all facilities at this source. Therefore, although the source is located in a county listed in 326 IAC 6-1-7, the requirements of 326 IAC 6-1-2 (Non-attainment Area Particulate Limitations) do not apply.

326 IAC 6-2-3 (Particulate Emissions Limitations for Sources of Indirect Heating)

The two (2) 1.2 million Btu per hour boilers, installed in 1952, located in the Purdue Technology Building, two (2) 10.0 million Btu per hour boilers and one (1) 8.33 million Btu per hour boiler, each installed in 1962, located in Northside Hall, one (1) 4.08 million Btu per hour boiler, installed in 1947, located in Greenlawn Hall, two (2) 6.982 million Btu per hour boilers, each installed in 1963, located in University Center, and the one (1) 0.125 million Btu per hour boiler, installed in 1935, located in the Fine Arts Building, are subject to 326 IAC 6-2-3 for particulate emissions from indirect heating facilities constructed before September 21, 1983. Pursuant to 326 IAC 6-2-3, the particulate matter (PM) emissions from each boiler shall be limited by the following equation:

$$Pt = \frac{C \times a \times h}{76.5 \times Q^{0.75} \times N^{0.25}}$$

Each boiler was constructed prior to June 8, 1972, therefore, pursuant to 326 IAC 6-2-3(b) the values of Q, N and h shall include the parameters for all facilities in operation on June 8, 1972.

Where:

Q = total source maximum operating capacity of 48.90 million British thermal units per hour
N = number of stacks in fuel burning operation = 6
h = weighted stack height of 20.95 feet
Pt = pounds of particulate matter emitted per million British thermal units of heat input
C = maximum ground level concentration with respect to distance from the point source at the "critical" wind speed for level terrain = 50 µg
a = plume rise factor of 0.67 (for Q < 1,000 MMBtu/hr)

$$Pt = \frac{50 \times 0.67 \times 20.95}{76.5 \times (48.90)^{0.75} \times (6)^{0.25}} = 0.32 \text{ pounds PM per million Btu of heat input}$$

Compliance Calculations:

Potential PM Emissions = 0.41 tons per year
= (0.41 tons PM/year) * (2,000 lbs/ton) * (1 year/8,760 hours) * (1 hour/48.90 MMBtu)
= 0.002 lbs PM per million Btu

Potential pounds of particulate matter per million Btu of heat input (0.002) is less than the 326 IAC 6-2-3 allowable rate (0.32 lbs PM/MMBtu of heat input), therefore, the boilers will comply with the requirements under 326 IAC 6-2-3.

326 IAC 6-2-4 (Particulate Emissions Limitations for Sources of Indirect Heating)

The 2.4 million Btu per hour natural gas fired boiler, 0.9 million Btu per hour natural gas fired boiler and the 0.25 million Btu per hour natural gas fired boiler, each installed in 1988 and located in the Schurz Library are subject 326 IAC 6-2-4 for particulate emissions from indirect heating facilities constructed after September 21, 1983. Pursuant to 326 IAC 6-2-4, the particulate matter (PM) emissions shall be limited by the following equation:

$$Pt = \frac{1.09}{Q^{0.26}}$$

Where:

Pt = pounds of particulate matter emitted per million British thermal units of heat input
Q = total source maximum operating capacity of 52.45 million British thermal units per hour

$$Pt = \frac{1.09}{52.45^{0.26}} = 0.39 \text{ pounds PM per million Btu of heat input}$$

Compliance Calculation:

Potential PM Emissions (2.4 MMBtu/hr boiler, 0.9 MMBtu/hr boiler & 0.25 MMBtu/hr boiler) = 0.03 tons PM per year
= (0.03 tons PM/year) * (2,000 lbs/ton) * (1 year/8,760 hours) * (1 hour/3.55 MMBtu)
= 0.002 lbs PM per million Btu

Potential pounds of particulate matter per million Btu of heat input (0.002) is less than the 326 IAC 6-2-4 allowable rate (0.39 pounds PM per million Btu of heat input), therefore, the boilers will comply with the requirements under 326 IAC 6-2-4.

Conclusion

The operation of the natural gas fired combustion equipment and emergency generator shall be subject to the conditions of the attached proposed **Exemption No. 141-7233-00158.**

Appendix A: Emission Calculations

Company Name: Indiana University - South Bend
Source Location: 1700 Mishawaka Avenue, South Bend, Indiana 46634
Exemption: 141-7233
Plt ID: 141-00158
Reviewer: Linda Quigley/EVP
Date: October 17, 2002

Uncontrolled Potential Emissions (tons/year)			
Emissions Generating Activity			
Pollutant	Natural Gas Combustion	Standby Generator	TOTAL
PM	0.47	0.39	0.86
PM10	1.89	0.39	2.28
SO ₂	0.15	0.36	0.51
NO _x	24.83	5.46	30.29
VOC	1.36	0.44	1.80
CO	20.69	1.18	21.87
total HAPs	0.47	negl.	0.47
worst case single HAP	0.44	negl.	0.44
Hexane			
Total emissions based on rated capacity at 8,760 hours/year.			
Controlled Potential Emissions (tons/year)			
Emissions Generating Activity			
Pollutant	Natural Gas Combustion	Standby Generator	TOTAL
PM	0.47	0.39	0.86
PM10	1.89	0.39	2.28
SO ₂	0.15	0.36	0.51
NO _x	24.83	5.46	30.29
VOC	1.36	0.44	1.80
CO	20.69	1.18	21.87
total HAPs	0.47	negl.	0.47
worst case single HAP	0.44	negl.	0.44
Hexane			
Total emissions based on rated capacity at 8,760 hours/year, after control.			

Appendix A: Emissions Calculations**Natural Gas Combustion Only****MM BTU/HR <100****Small Industrial Boiler****HAPs Emissions**

Company Name: Indiana University - South Bend
Address City IN Zip: 1700 Mishawaka Avenue, South Bend, Indiana 46634
Exemption: 141-7233
Plt ID: 141-00158
Reviewer: Linda Quigley/EVP
Date: October 17, 2002

Heat Input Capacity*
MMBtu/hr

Potential Throughput
MMCF/yr

1.00

8.8

*Heat Input Capacity includes: one (1) 0.075 MMBtu/hr space heater, one (1) 0.25 MMBtu/hr boiler, one (1) 0.10 MMBtu/hr dye pot, two (2) 0.197 MMBtu/hr hot water heaters, one (1) 0.125 MMBtu/hr boiler, and one (1) 0.06 MMBtu/hr hot water heater.

	Pollutant					
	PM*	PM-10*	SO ₂	NO _x	VOC	CO
Emission Factor in lb/MMCF	1.9	7.6	0.6	94.0	5.5	40.0
Potential Emission in tons/yr	0.01	0.03	0.00	0.41	0.02	0.18

*PM emission factor is filterable PM only. PM10 emission factor is filterable and condensable PM10 combined.

Methodology

All emission factors are based on normal firing.

MMBtu = 1,000,000 Btu

MMCF = 1,000,000 Cubic Feet of Gas

Potential Throughput (MMCF) = Heat Input Capacity (MMBtu/hr) x 8,760 hrs/yr x 1 MMCF/1,000 MMBtu

Emission Factors are from AP 42, Chapter 1.4, Tables 1.4-1, 1.4-2, 1.4-3, SCC #1-02-006-02, 1-01-006-02, 1-03-006-02, and 1-03-006-03

(SUPPLEMENT D 3/98): NO_x and CO emission factors are for Residential Furnaces (no SCC)

Emission (tons/yr) = Throughput (MMCF/yr) x Emission Factor (lb/MMCF)/2,000 lb/ton

See page 3 for HAPs emissions calculations.

**Appendix A: Emissions Calculations
Natural Gas Combustion Only**

**MM BTU/HR <100
Small Industrial Boiler
HAPs Emissions**

Company Name: Indiana University - South Bend
Address City IN Zip: 1700 Mishawaka Avenue, South Bend, Indiana 46634
Exemption: 141-7233
Plt ID: 141-00158
Reviewer: Linda Quigley/EVP
Date: October 17, 2002

HAPs - Organics

Emission Factor in lb/MMcf	Benzene 2.1E-03	Dichlorobenzene 1.2E-03	Formaldehyde 7.5E-02	Hexane 1.8E+00	Toluene 3.4E-03
Potential Emission in tons/yr	9.235E-06	5.277E-06	3.298E-04	7.916E-03	1.495E-05

HAPs - Metals

Emission Factor in lb/MMcf	Lead 5.0E-04	Cadmium 1.1E-03	Chromium 1.4E-03	Manganese 3.8E-04	Nickel 2.1E-03
Potential Emission in tons/yr	2.199E-06	4.837E-06	6.157E-06	1.671E-06	9.235E-06

Methodology is the same as page 2.

The five highest organic and metal HAPs emission factors are provided above.
Additional HAPs emission factors are available in AP-42, Chapter 1.4.

Appendix A: Emissions Calculations**Natural Gas Combustion Only****MM BTU/HR <100****Small Industrial Boiler**

Company Name: Indiana University - South Bend
Address City IN Zip: 1700 Mishawaka Avenue, South Bend, Indiana 46634
Exemption: 141-7233
Plt ID: 141-00158
Reviewer: Linda Quigley/EVP
Date: October 17, 2002

Heat Input Capacity
MMBtu/hr

Potential Throughput
MMCF/yr

55.75

488.4

Heat Input Capacity includes: two (2) 1.2 MMBtu/hr boilers, three (3) 0.75 MMBtu/hr space heaters, one (1) 2.4 MMBtu/hr boiler, one (1) 0.9 MMBtu/hr boiler, two (2) 10 MMBtu/hr boilers, one (1) 8.33 MMBtu/hr boiler, one (1) 4.08 MMBtu/hr boiler, one (1) 0.625 MMBtu/hr furnace, two (2) 6.982 MMBtu/hr boilers, one (1) 0.50 MMBtu/hr roof-top unit and one (1) 0.30 MMBtu/hr roof-top unit.

	Pollutant					
	PM*	PM10*	SO2	NOx*	VOC	CO
Emission Factor in lb/MMCF	1.9	7.6	0.6	100.0	5.5	84.0
Potential Emission in tons/yr	0.46	1.86	0.15	24.42	1.34	20.51

*PM emission factor is filterable PM only. PM10 emission factor is filterable and condensable PM10 combined.

**Emission Factors for NOx: Uncontrolled = 100, Low NOx Burner = 50, Low NOx Burners/Flue gas recirculation = 32

Methodology:

MMBtu = 1,000,000 Btu

MMCF = 1,000,000 Cubic Feet of Gas

Potential Throughput (MMCF) = Heat Input Capacity (MMBtu/hr) x 8,760 hrs/yr x 1 MMCF/1,000 MMBtu

Emission Factors are from AP 42, Chapter 1.4, Tables 1.4-1, 1.4-2, 1.4-3, SCC #1-02-006-02, 1-01-006-02, 1-03-006-02, and 1-03-006-03 (SUPPLEMENT D 3/98)

Emission (tons/yr) = Throughput (MMCF/yr) x Emission Factor (lb/MMCF)/2,000 lb/ton

See page 2 for HAPs emissions calculations.

**Appendix A: Emissions Calculations
Natural Gas Combustion Only**

Page 5 of 6 TSD App A

**MM BTU/HR <100
Small Industrial Boiler
HAPs Emissions**

**Company Name: Indiana University - South Bend
Address City IN Zip: 1700 Mishawaka Avenue, South Bend, Indiana 46634
Exemption: 141-7233
Plt ID: 141-00158
Reviewer: Linda Quigley/EVP
Date: October 17, 2002**

HAPs - Organics

Emission Factor in lb/MMcf	Benzene 2.1E-03	Dichlorobenzene 1.2E-03	Formaldehyde 7.5E-02	Hexane 1.8E+00	Toluene 3.4E-03
Potential Emission in tons/yr	5.128E-04	2.930E-04	1.831E-02	4.395E-01	8.302E-04

HAPs - Metals

Emission Factor in lb/MMcf	Lead 5.0E-04	Cadmium 1.1E-03	Chromium 1.4E-03	Manganese 3.8E-04	Nickel 2.1E-03
Potential Emission in tons/yr	1.221E-04	2.686E-04	3.419E-04	9.279E-05	5.128E-04

Methodology is the same as page 4.

The five highest organic and metal HAPs emission factors are provided above.
Additional HAPs emission factors are available in AP-42, Chapter 1.4.

Appendix A: Emission Calculations
Internal Combustion Engines - Diesel Fuel
Turbine (<600 HP)
Reciprocating

Page 6 of 6 TSD App A

Company Name: Indiana University - South Bend
Address City IN Zip: 1700 Mishawaka Avenue, South Bend, Indiana 46634
Exemption: 141-7233
Pit ID: 141-00158
Reviewer: Linda Quigley/EVP
Date: October 17, 2002

A. Emissions calculated based on heat input capacity (MMBtu/hr)

Heat Input Capacity
MM Btu/hr

0.1

Emission Factor in lb/MMBtu	Pollutant					
	PM	PM-10	SO ₂	NO _x	VOC	CO
	0.31	0.31	0.29	4.41	0.4	0.95
Potential Emission in tons/yr	0.14	0.14	0.13	1.98	0.16	0.43

B. Emissions calculated based on output rating (hp)

Heat Input Capacity
Horsepower (hp)

Potential Throughput
hp-hr/yr

40.2

352,239.6

Emission Factor in lb/hp-hr	Pollutant					
	PM	PM-10	SO ₂	NO _x	VOC	CO
	0.0022	0.0022	0.0021	0.0310	0.0025	0.0067
Potential Emission in tons/yr	0.39	0.39	0.36	5.46	0.44	1.18

Methodology

Potential Throughput (hp-hr/yr) = hp * 8,760 hr/yr

Emission Factors are from AP-42 (Fifth edition, January 1995), Table 3.3-2

Emission (tons/yr) = [Heat input rate (MMBtu/hr) x Emission Factor (lb/MMBtu)] * 8,760 hr/yr / (2,000 lb/ton)

Emission (tons/yr) = [Potential Throughput (hp-hr/yr) x Emission Factor (lb/hp-hr)] / (2,000 lb/ton)